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ABSTRACT

Lagoons and their characteristic coastal bay-mouth bars represent 15 percent of the world coastal zone. They are among the most productive ecosystems in the biosphere, this productivity resulting from the interplay of ocean and continent. An International Symposium on Coastal Lagoons (ISCOL) was held to: assess the state of knowledge in the various fields of research on these lagoons; bring about consultation and collaboration between specialists in the developed and less developed countries; and establish interdisciplinary programs of joint research and training in an international regional framework which could uncover scientific bases for the development and management of coastal lagoons and their interfaces. ISCOL proceedings are presented in this three-part report: (1) introduction (includes background information); (2) objectives and organization of the symposium (includes highlights of sessions); and (3) recommendations. The latter include general recommendations and those related to: research; education and training through research; and development and management. A list of participants, the ISCOL program, and questions for a panel discussion on scientific aspects, exploitation, and management of lagoons are provided in the three appendices. (JN)

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International Symposium on Coastal Lagoons

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Bordeaux, France
8-14 September 1981

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27	Collected reports of the joint panel on oceanographic tables and standards, 1964-1969	1976	WG 10
28	Eighth report of the joint panel on oceanographic tables and standards, Woods Hole, U.S.A., sponsored by Unesco, ICES, SCOR, IAPSO	1978	WG 10
29	Committee for the preparation of CLOFETA - Report of the first meeting, Paris, 16-18 janvier 1978	1979	
30	Ninth report of the joint panel on oceanographic tables and standards, Unesco, Paris. 11-13 September 1978	1979	
31	Coastal lagoon survey (1976-1978)	1980	
32	Costal lagoon research, present and future. Report and guidelines of a seminar, Duke University Marine Laboratory, Beaufort, NC, U.S.A., August 1978. (Unesco, IABO).	1981	
33	Coastal lagoon research, present and future. Proceedings of a seminar, Duke University, August 1978. (Unesco, IABO).	1981	
34	The carbon budget of the oceans. Report of a meeting, Paris, 12-13 November 1979	1980	WG 62
35	Determination of chlorophyll in seawater. Report of intercalibration tests sponsored by SCOR and carried out by C.J. Lorenzen and S.W. Jeffrey, CSIRO Cronulla, N.S.W., Australia, September-October 1978	1980	
36	Tenth report of the joint panel on oceanographic tables and standards, Sidney, B.C., Canada, 1-5 September 1980. Sponsored by Unesco, ICES, SCOR, IAPSO.	1981	WG 10
37	Background papers and supporting data on the Pratical Salinity Scale 1978.	1981	WG 10
38	Background papers and supporting data on the International Equation of State of Seawater 1980.	1981	WG 10
39	International Oceanographic Tables, Vol. 3.	1981	WG 10
40	International Oceanographic Tables, Vol. 4. (To be published).	1982	WG 10
41	Ocean-Atmosphere Materials exchange (OAMEX).	1982	WG 44

PREFACE

This series, the Unesco Technical Papers in Marine Science, is produced by the Unesco Division of Marine Sciences as a means of informing the scientific community of recent developments in oceanographic research and marine science affairs.

Many of the texts published within the series result from research activities of the Scientific Committee on Oceanic Research (SCOR) and are submitted to Unesco for printing following final approval by SCOR of the relevant working group report.

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I. INTRODUCTION

Lagoons and their characteristic coastal bay-mouth bars represent 15% of the world coastal zone. They can be found from the equator to the poles. The ecological systems sheltered by coastal sand barriers - lakes (brackish and hypersaline), salt marshes, tropical mangroves, swamps and deltas - receive oceanic and continental inputs. They are among the most productive ecosystems in the biosphere.

The productivity results from the interplay of ocean and continent. In the lagoons land and fresh water inputs undergo biogeochemical changes. Afterwards a part of them is transported in the masses of water sent to the open sea. Oceanic inputs play an important part in the process of fertilization of the lagoons. A large number of euryhaline species establish themselves permanently in the lagoons; others colonize them temporarily for the purpose of reproduction.

Man's conquest of lagoons has given rise to a wide variety of cultures and activities ranging from subsistence economies and siege economies to fishing and extensive or intensive fish-farming. This range extends to massive concentrations of port industry, to urban activities and to tourist development schemes.

Over the last 20 years the interest of the scientific community in these important ecosystems has been growing. Research on the coastal lagoons is directed towards an analysis which combines a description of the systems with a study of their working processes. At present, these approaches take into account the physical and geomorphological processes, the chemical and geochemical reactions as well as their repercussions on the biological systems. Such lines of research necessitate studies designed to improve our understanding of the sedimentation models, the biological and biogeochemical energy and material exchanges, the dynamics of biological production and the factors which determine the adaptation of living organisms to their milieu. Recent research developments in these fields may lead to definite proposals and predictions which will enable those responsible for development to strike a balance between economic constraints and the risks involved.

In the international context, the recent efforts of Unesco are moving in this direction. The Unesco programme in marine sciences is working in close collaboration with the "Man and the Biosphere" (MAB) programme, the Intergovernmental Oceanographic Commission (IOC) and several committees of the International Council of Scientific Unions (ICSU), notably the Scientific Committee on Oceanic Research (SCOR) and the International Association for Biological Oceanography (IABO). The activities of these committees have resulted in the establishment of consulting groups of experts capable of synthesizing the already considerable body of basic knowledge on lagoons and, more generally, on estuaries, the coastline and the continental shelf. The tendency is toward a scientific management of coastal lagoons which provides for their protection.

In response to the United Nations Conference on Science and Technology for Development in Vienna in 1980, Unesco launched nine major projects. For this decade, the major project on coastal zones consists of integrated research approaches put to the test over the last few years in the development of projects on mangroves and coastal lagoons.

In 1974, at the request of the Division of Marine Sciences of Unesco, the Scientific Committee on Oceanic Research (SCOR) created an ad hoc SCOR/Unesco Advisory Panel on Coastal Lagoons, charged with assessing the relative knowledge of lagoon research in temperate and tropical regions.

In one of its recommendations, the SCOR/Unesco ad hoc Advisory Panel on Coastal Lagoons asserted that an analytical census of research programmes under way was indispensable and that such a census would make it possible to establish the importance of activities taking place and to predict lines of research.

In the years which followed (1976 to 1978) the ad hoc Panel made an enquiry into the research programmes undertaken by laboratories and research organizations the world over. Nearly 200 programmes were thus tabulated and examined - an unexpected result ! The number of replies (more than 500) and the correspondance which followed clearly showed the growing interest of the scientific community and research and development organizations in coastal lagoons. The complete results of this enquiry are published in No. 31 of "Unesco Technical Papers in Marine Sciences", 1980 (280 pages).

From the worldwide enquiry on coastal lagoons it was deduced that 92% of scientists responsible for study projects thought that an international symposium under the auspices of Unesco should be held, at which they would be willing to present one or more papers.

A multidisciplinary seminar was held under the auspices of Unesco and the International Association for Biological Oceanography (IABO) at Duke University Marine Laboratory, Beaufort, North Carolina, U.S.A., from 28 August to 2 September, 1978. It established a series of guidelines for research which it would be desirable to carry out within a framework of regional co-operation as conceived by Unesco. The Proceedings of this seminar were published in No. 32 of the Series "Unesco Technical Papers in Marine Sciences", 1981, (97 pages).

Conceptual frameworks for co-operative research programmes have been established or proposed in recent years as a result of regional seminars or workshops organized for Africa (Tunis in 1978, Dakar in 1979 and Addis Abeba in 1980), for Asia and the Pacific (Dacca in 1978, Motupore Island, Papua New Guinea in 1980) and for Latin America (Montevideo in 1978).

II. OBJECTIVES AND ORGANIZATION OF THE SYMPOSIUM

The proposal to hold an international symposium on coastal lagoons, (ISCOL), formulated in 1979 by the Unesco "Consultative Committee on Coastal Zones", was adopted in 1980 by the Unesco General Conference in Belgrade, with the objective of improving the scientific bases of knowledge and management of lagoons and their resources.

France having subscribed to the proposition, the organization of the symposium was entrusted to the University of Bordeaux I and the French National Commission for Unesco.

The International Symposium on Coastal Lagoons (ISCOL), co-sponsored by Unesco, SCOR, IABO and the French government, had three principal objectives :

1. to assess the state of knowledge in the various fields of research,

2. to bring about consultation and collaboration between specialists in the developed countries and less favoured countries,

3. to establish interdisciplinary programmes of joint research and training in an international regional framework which could uncover the scientific bases for the development and management of coastal lagoons and their interfaces.

The designation of conference participants and other specialists invited by Unesco, the selection of papers and the drafting of the programme were entrusted to an international scientific committee presided over by Professor H. Postma (Netherlands).

Professor P. Lasserre, University of Bordeaux I, France, as Unesco Consultant and Secretary General of the symposium, undertook the setting up and general co-ordination of the symposium.

Professor M. Vigneaux of the University of Bordeaux I presided over the French organizing committee of the symposium.

The ISCOL took place on the campus of the University of Bordeaux I, at Talence, from 8 to 14 September, 1981. In attendance were 280 specialists from 40 countries, as well as representatives from the UN, FAO, the MAB Programme, the IOC, and scientific committees of ICSU, e.g. SCOR and IABO.

The following countries were represented (see list of participants in Appendix I) :

Albania, Algeria, Argentina, Australia, Bangladesh, Belgium, People's Republic of Benin, Brazil, People's Republic of China, Columbia, the Congo, Denmark, Egypt, Ecuador, France, Gabon, Federal Republic of Germany, Ghana, Greece, India, Israel, Italy, Ivory Coast, Japan, Korea, Mauritania, Mexico, Morocco, Netherlands, Nigeria, Norway, Portugal, Senegal, Spain, Sweden, Tunisia, USSR, United Kingdom, United States of America and Venezuela.

The Symposium was inaugurated on Tuesday 8 September, 1981, at 9.15 a.m. by the welcome of the President of the University of Bordeaux I, Professor D. Lavroff. Thereafter Dr. M. Steyaert, of the Unesco Division of Marine Sciences, welcomed the participants on behalf of the Director-General of Unesco and gave an account of the preparation of this symposium.

The President of the international scientific committee, Professor H. Postma, then thanked the participants for showing so much interest in the symposium. Having warmly thanked the French organizing committee, presided over by Professor M. Vigneaux, he outlined the main objectives of the symposium. He then asked Professor P. Lasserre, Secretary General of the symposium, to proceed to the election of Presidents, Vice-Presidents and Rapporteurs for the sessions.

The working languages of the symposium were English, French and Spanish. There was simultaneous interpretation during the plenary sessions. The papers were presented either orally in the plenary (mornings) sessions and other sessions (afternoons) or as posters.

The international scientific committee of the symposium examined summaries of the papers sent in by the authors in April 1981 and the selection of papers was based on the committee's recommendations. The abstracts accepted were published in a special volume which was given to all the participants.

The proceedings of the symposium will be published in a special volume of Oceanologica Acta.

Certain specialists were invited to present lectures on the four general themes of the symposium :

1. Origin and evolution of coastal lagoons
2. The lagoon environment
3. Life in coastal lagoons
4. Scientific management of coastal lagoons

These 14 lectures were given at morning plenary sessions.

Papers (75) and posters (50) were presented in the course of the sessions of Tuesday 8, Wednesday 9 and Thursday 10 September on various subjects concerning geological history and morphology : (1) the origin and evolution of lagoons, (2) physics and chemistry, (3) sedimentation, (4) geochemistry and metabolism, (5) nutrients and primary production, (6) population dynamics and food webs, (7) aquaculture, (8) stress and pollution, and (9) lagoon environment and management.

During the sessions of Friday 11 and Saturday 12 September, devoted to panel discussions on aspects of priority research which could bring about integrated development of lagoons, there was a real dialogue between scientists from developed countries and those from less favoured countries. The questions addressed by the symposium fell into two groups concerning, on the one hand, the scientific aspects, and, on the other, the development and exploitation of lagoons (see Appendices 2 and 3).

A text of final recommendations (see later), drawn up by working groups during the symposium, was discussed, amended and unanimously accepted by ISCOL in the closing session, Saturday 12 September.

The ISCOL closing ceremony on Saturday, 12 September, consisted of addresses given by Professor A.R. Kaddoura, Assistant Director-General for Science of Unesco, by Mr. Jacques Chaban-Delmas, Member of the French Parliament and Mayor of Bordeaux, and by Mr. Michel Crepeau, Minister of the Environment.

Professor Kaddoura, on behalf of Mr. Amadou Mahtar M'Bow, Director-General of Unesco, expressed the great interest which the organization accorded to this assembly and said that the Director-General and himself considered it as a key stage in the bringing into operation of the Unesco major project consecrated to "scientific bases necessary for the development of the coastal zones".

Mr. Jacques Chaban-Delmas expressed pleasure at the presence of so many eminent scientists in Aquitaine under the auspices of Unesco. He underlined that the oceanic coast of the Gulf of Gascogne presented exceptional examples of lagoon sites : such as the Bassin d'Arcachon, the lakes of the Landes and the marshlands of the Charente.

Mr. Michel Crepeau spoke at length of the major interest which his ministry and, more generally, the French government had in the problems of the integrated management of coastal systems which marked the limit of the ocean and the continent. He thanked the organizers of the symposium, and invited the specialists present to take part in a visit with commentary to the lagoon sites, both natural and man-made in the Arcachon basin and the salt marshes of the Talmont, Brouage and La Rochelle regions.

Scientific films concerning the coastal zones and, more specifically, lagoons, marshlands, and mangroves were shown in the evening of 9 September. These films deal with various aspects concerning the physical models of sedimentation and hydraulics, the biology of the lagoons and the exploitation of their resources.

The participants were received by the Bordeaux Chamber of Commerce and Industry (Tuesday, 8 September) and by the Municipality of Bordeaux (Friday, 11 September). There was a dinner with traditional dances of the Bordeaux region for all participants at the Chateau de Roquetaillade.

III. RECOMMENDATIONS

The Unesco International Symposium on Coastal Lagoons (ISCOL),

CONVINCED of the scientific, socio-economic and cultural importance of coastal lagoons, and

NOTING

(a) that lagoons occupy about 15% of the earth's coastal zones; that they constitute essential zones of interaction between the continent and the ocean and that they play a considerable biological and economic role far beyond their seemingly limited geographical extent,
(b) that behind their characteristic coastal sand barriers they shelter highly productive ecosystems such as marshlands, tropical mangrove swamps and lakes of variable salinity,
(c) that the lagoon ecosystems are areas of reproduction and growth for a sedentary and migratory flora and fauna, which have great scientific and economic importance,
(d) that they offer important shelter for resting migratory birds,
(e) that the lagoon sediments contain mineral wealth,
(f) that man's presence in lagoons dates from early times and that this has given rise to a wide variety of often prosperous traditional economies, including navigation, fishing, marine and brackish-water aquaculture;

RECALLING that lagoons are subject to natural modifications and that they are vulnerable to man-made disturbances;

CONSIDERING that coastal resources will have to provide nourishment for an increasing human population, if sensible and rational forms of management of large areas of lagoons are developed and if their acceptance capacity and resources are precisely evaluated;

BEARING in mind in this respect that the present forms in which lagoons are used, as is seen in port development, industrial development, and tourist and urban development, can change the natural capacity of energy production and of biological production in a lasting or sometimes irreversible fashion, however essential they may be for numerous human populations, especially in developing countries.

1. STRESSES the ever-growing interest of the international scientific community in lagoons and, more generally, the coastal zone;

2. NOTES with satisfaction the interest and new importance which Unesco and the other organizations of the United Nations, in co-operation with Member States and the national and international scientific non-governmental organizations (for example ICSU), have accorded for some years to the development of research and training programmes on coastal systems and, in particular, on lagoons;

3. CONSIDERS that such defined research programmes are conceptual and practical tools destined to:

(a) establish scientific bases for the management of lagoons, their rational development and the protection of their natural resources,

(b) safeguard or(construct) ecological models of economic development integrated with the social and cultural fabric of the countries and regions concerned;

4. RECOMMENDS

(a) Research

The solution to the numerous and specific problems posed by the development and exploitation of lagoons will be brought about through an in-depth scientific knowledge of the coastal system in its entirety.

The features of the zone of interaction between the continent and the ocean vary and they are very complicated in estuaries, deltas and lagoons. The latter develop, in general, parallel to the coast and are protected from the ocean by a coastal spit or a network of islands which form a barrier. Like estuaries and deltas, lagoons are normally characterized by high rates of biological production linked on the one hand to the abundance of nutrients, of continental and oceanic origin, and on the other hand because of the protection from the swells of the open sea, as well as because of the shallowness of the waters. The hydrodynamic and physico-chemical properties of the waters and their sedimental characteristics are influenced by the proximity of the continent. The physical and chemical gradients, both temporal and spatial, are greater there than in the ocean.

The lagoon shallowness and the insolation favour the development of a dense vegetation. This substratum is utilized by populations of micro-organisms and metazoans with high rates of renewal; moreover, it serves as a shelter and nursery for numerous sedentary and migratory organisms of high scientific and economic interest, notably molluscs, crustaceans, fish, reptiles, birds and mammals.

To increase our understanding of coastal systems, research must be oriented towards models combining reductionist and holistic approaches. The development of these models, however, is hampered by our inadequate knowledge about (1) the rate processes involved and (2) the functional relationships between coastal systems.

The major objective of this research is to acquire basic data on the processes which affect the oceanic-lagoon-continental interface. This objective must be served by the elaboration of mathematical models, research tools (descriptive or explanatory models), and tools for synthesis and management (predictive models). It is desirable to tackle the elaboration of models which envisage the overall functioning of lagoon systems and of their interfaces with the ocean and the continent and which, finally, predict their evolution. The use of all the modern techniques of cartography and remote sensing is essential.

For the dynamic modelling of lagoon systems, the study must start with the choice of relevant variables and by the determination of a scale of observation. Quite evidently, these choices are not neutral: they are determined from the onset by the conceptual models which we place on reality, that is to say, by our foreknowledge of the problem.

Moreover, certain chemical, biological, hydrodynamical and sedimentological processes and their action on very different management models should be worked out with the aid of experimental pilot systems, whether in situ or in the laboratory, as demonstration projects. Thus, one could envisage the setting up of programmes of comparative analysis of lagoons in different latitudes.

It is desirable to develop means of research adapted to and more particularly for the study of the following topics :

(1) The balance of the sources of matter and energy which affect the oceanic-lagoonal-continental interface, which enable the chemical, sedimentological and biological characteristics of the inflows and outflows of the lagoon system : coastal circulation, tidal currents, winds, atmospheric inputs, continental inputs, movements of coastal spits and erosion to be defined ;

(2) Characteristic mechanisms of the oceanic-lagoonal-continental interface, such as :

- hydrodynamic, sedimentological (floculation etc.),
- chemical and geochemical (speciation, desorption, precipitation, recycling, etc.,
- biological and biochemical (population dynamics, bioturbation, metabolism, strategies of adaptation, sensitivity to pollution) ;

(3) The influence of human activity on the balances, the sources and the mechanisms : impact of dredging, diffused and locally concentrated waste products, fishing and aquaculture, tourism and urban concentration, etc.

(4) Models which combine reductionist and holistic approaches, and which provide theoretical bases for measuring and controlling flow of energy and matter (see for example, the monograph on "Mathematical Models in Biological Oceanography"*, published by Unesco and SCOR in 1981).

The necessity for a multidisciplinary approach is henceforth more apparent and calls for the collaboration of a wide spectrum of scientists : biologists, chemists, geologists, physicists, mathematicians, sociologists and economists.

For all these aspects, it seems indispensable to use standards and methodologies which are intercalibrated. The development of new sampling methods and of both reductionist and holistic approaches is essential.

Certain aspects of research could be resolved in relatively short time, of the order of two to three years, in particular if their study is tackled on the basis of co-ordinated actions. Other research programmes, like the comparative ecological study of lagoons situated in different latitudes must, on the other hand, continue without interruption. It is as well not to underestimate the length of time which will be necessary to resolve certain questions and to develop research and training infrastructure with this in mind.

The replies to the worldwide enquiry on coastal lagoons, published by Unesco in 1980 and concerning the period 1976-1978, show that a considerable number or which would be capable of doing so if encouraged. Various seminars, regional workshops and the present symposium propose guidelines for research to be carried out in the framework of international co-operation drawn up by Unesco.

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* Monograph on oceanographic methodology N° 7, Unesco, Paris, 1981.

b) Education, training through research

Unesco and the individual states are reminded that the teaching effort is inseparable from that of research. This effort calls for :

(1) The increase and improvement of the opportunities for information : data banks, documentary services, publications in the form of reviews technical manuals, syntheses,

(2) The improvement of possibilities of exchange between senior scientists, junior scientists and students, facilitated by the allocation of grants and fellowships,

(3) The distribution of detailed information, audio-visual material included, relevant to teaching programmes at all levels offered by universities and other training institutes.

Programmes of specialist training and re-cycling are highly desirable. Unesco is asked to facilitate the setting up of training programmes closely associated with research programmes underway and thus to bring about real training by research.

c) Development and management

The prime task of management is to define the objectives. To do this, different alternatives - scenarios - must be taken into consideration. When this first stage has been accomplished, the specific problems which require the setting up of research must be defined. All the specific problems of the geographical area must be carefully considered : these can be divided into two categories,

(i) problems which can be resolved by present knowledge,
(ii) problems which require research : the success of which will depend on the means allocated (finance, personnel, duration).

Decision-making for development and management requires, in the context of the coastal zone, and more than elsewhere, the integration of all kinds of information : scientific, socio-economic and political. It is recognized that such decisions are, by necessity, short-term. The time scale here is from one to five years. This must be kept in mind when organizing programmes. The best approach is to work on several time scales. Natural long-term changes require observations which can be followed over several months or years. These different time scales combined with different spatial scales enable a hierarchy of decision-making to be established.

It is the job of the decision-maker or politician to decide the hierarchy of objectives of development and management, but it is highly desirable that the latter should have at their disposal scientific information which is both critical and pertinent.

The symposium wishes that guidelines could be elaborated by the scientists by undertaking an analysis of the critical variables which influence the global dynamic of the lagoons.

The symposium suggests also that Unesco and individual states increase the opportunities for exchanges of view between small groups of scientists, specialists in coastal systems and possessing field experience. Such groups of experts can identify the lines of short- and medium-term research taking into account the present stage of knowledge and underlining what is unknown or partly-known. The document "Coastal Lagoon Research : Present and Future" published by Unesco (Unesco technical papers No 32, 1981, 97 pages) could be taken as an example.

The symposium is very anxious about the lack of clear rules on the rational utilization of coastal lagoons. It underlines the need to reinforce or to create lines of communication between scientists and managers. These exchanges organized, for example in the form of multidisciplinary workshops, working towards common objectives, can give rapid and effective results.

We recognize that the majority of questions posed by the management of lagoons require quick decisions to be taken, and that there is little chance that long term planning will be favoured by decision-makers, without substantial justification.

It is recognized that the task of a manager is to take decisions in a context of incertitude. The role of the scientist is to help to limit this incertitude where it concerns management problems and it can be resolved by an effort of objective research.

5. HOPES that Unesco continues its encouragement of multidisciplinary research and training by research in coastal systems ;

HOPES for a reinforcement of the Unesco Major Programme on the coastal zone by the allocation of means commensurate with the scope of this Programme ;

IS CONVINCED that this effort will contribute to promoting and accelerating the development of socio-economic models adapted to developing countries and which respect the historical and cultural particularities of the regions concerned and their traditional economies. The rehabilitation and adaptation of these traditional economies to present-day necessities and demographic pressure can be envisaged. The undermining and destruction of such traditional models in favour of "higher performant" ones can seriously disrupt the coastal ecosystems and the human populations which they sustain, by pollution, the lowering of the natural productivity of the ecosystems and by massive migration towards urban centres.

6. RECOGNIZES and underlines the importance of missions of consultants, of seminars, regional workshops and of the present symposium, organized under the auspices of Unesco, in co-operation with several scientific committees of the International Council of Scientific Unions (ICSU), such as the Scientific Committee on Oceanic Research (SCOR) and the International Association of Biological Oceanography (IABO), and in liaison with the Man and the Biosphere (MAB) Programme and the Intergovernmental Oceanographic Commission (IOC).

It is noteworthy that from such activities originated working papers, enquiries, reports, critical works of synthesis and methodological manuals. The latter are highly stimulating for research and at the same time contribute to the dissemination of knowledge. These works contribute to the establishment of a thesaurus on the coastal zone.

7. INVITES member states, Unesco and other international organizations to consider that research and development programmes on the coastal zone, and, more particularly lagoons, are ipso facto very much social actions. This is true in their effects, their "fall-out", as in their forms : organization and collective work. Their development requires adequate human and material means in all sectors. Their progress is proportional to the resources which society gives them : they are subject to the "external" demand or social demand and at the same time to the "internal" logic of science. The direction of the research effort in each country should meet both needs.

8. CONCLUDES by declaring that in less advanced countries, the application of models of research and development based on exclusively western standards too rigidly or too rapidly can lead to homogenization. This in turn, is a source of impoverishment of the forces of innovation and creativity. Efforts must be made to remedy the fragmentation and dispersal of objectives between research, administration and decision making. The setting up of integrated pilot projects of research, training and demonstration can be envisaged in the framework of the Unesco Major Programme on the coastal zone, in liaison with the committees, and international and national organizations concerned. It is to be hoped that the pilot projects would be directed towards concrete programmes of the rational utilization of the lagoon environment and the management of its resources, such as they are felt at local and regional levels. The main aim of the pilot projects is to produce information in the natural and exact sciences and, also, in the social sciences, which could be directly used by the countries of a single region to resolve the urgent problems of management and conservation of the coastal zone.

ANNEX 1

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Annex II

INTERNATIONAL SYMPOSIUM ON COASTAL LAGOONS

Bordeaux, France, 8-12 September 1981

PROGRAMME

BUREAU OF THE OPENING SESSION

Hank POSTMA, Chairman
Pierre LASSERRE, Secretary-General
Marc STEYAERT, Unesco Representative

Election of Chairmen (C.), Vice-Chairmen (VC.) and Rapporteurs (R.)

I. "ORIGIN AND EVOLUTION OF COASTAL LAGOONS"

Plenary session (C. : H. POSTMA, V.C. : C. MARTENS, R. : E.S. DIOP)

- "Histoire géologique des lagunes" A. KLINGEBIEL (France)
- "Interest of remote sensing in coastal lagoons research" H.G. GIERLOFF-EMDEN (F.R.G.)
- "Changes on barriers and spits enclosing coastal lagoons" E.C.F. BIRD (Australia)
- "Effects of artificial structures on coastal lagoon processes and forms" H.J. WALKER, J. MOSSA (U.S.A.)

Ordinary session : Origin and evolution of lagoons
(C. : G. EVANS, R. : M. SNOUSSI)

- "La tendance évolutive du littoral Emilien-Romagnol (Italie) L. CARBOGNIN, P. GATTO, F. MARABINI, G. MOZZI, G. ZAMBON (Italie)
- "Coastal changes as related to vicissitudes of longshore sediments, a case study of Haizhou Bay, China" WANG BAO CAN (China)
- "Algunas características físico-químicas de la Laguna de Unare, Venezuela" P. ROA, A. BAY (Venezuela)
- "Study of the lagoa dos Patos, Brazil" L.R. MARTINS, J.A. VILLWOCK, I.R. MARTINS (Brazil)
- "Aspectos evolutivos y ambientales de la laguna Mar Chiquita (Provincia de Buenos Aires, Argentina)" J.L. FASANO, M.A. HERNANDEZ, F.I. ISLA, E.J. SCHNACK (Argentina)

- "Hidrología de cuatros lagunas costeras del noroeste de Mexico" F.A. MANRIQUE (Mexico)

- "Réponses populationnelles aux contraintes exercées dans les paléomilieux marginolittoraux plus ou moins fermés: exemples pris chez trois genres d'Ostracodes du tertiaire" O. DUCASSE et L. ROUSSELLE (France)

- "Reconstitution de l'histoire d'un système laguno-littoral à évolution rapide par ses caractéristiques hydrodynamiques repérées au moyen des ostrocofaunes et des sédiments: la Baie de Bonne Anse, Pointe de la Coubre, France" P. CARBONNEL et J.M. JOUANNEAU (France)

- "Comportement des microfaunes benthiques en milieu lagunaire: les foraminifères et les ostracodes du lac de Tunis" P. CARBONNEL et M. PUJOS (France)

II. "THE LAGOON ENVIRONMENT"

Plenary session (C.: C.I.O. OLANIYAN, V.C.: Y.HALIM, R.: S.W. NIXON)

- "Some principles of mixing in tidal lagoons" J. DRONKERS, J.T.F. ZIMMERMAN (Netherlands)

- "Sediment transport in coastal lagoons" M. NICHOLS (U.S.A.)

- "Biogeochemistry of organic-rich coastal lagoon sediments" C. MARTENS (U.S.A.)

- "The energetics of detritus utilization in coastal lagoons and nearshore waters" R.C. NEWELL (U.S.A.)

Ordinary sessions

The lagoon environment I (C.: S.A. PATIN, R.: C. MARTENS)

- "Datation radiometric et profil de polluants dans une carotte de la lagune de Venise" R. DONAZZOLLO, A.A. ORIO, B. PAVONI (Italie)

- "Effet d'une crise distrophique dans l'étang de Salses-Leucate" H. BOUTIERE, F. DE BOVEE, D. DELILLE, M. FIALA, C. GROS, G. JACQUES, M. KNOEPFFLER, J.P. LABAT, M. PANOUSE, J. SOYER (groupe ECOLAG, France)

- "Oxygen distribution in Lake Menzalah" Y. HALIM, S.K. GUERGUESS (Egypt)

- "Oil pollution and the carbon isotope ratio in organisms and recent sediments of coastal lagoons in the Gulf of Mexico" A.V. BOTELLO (Mexico)

The lagoon environment II (C.: J.T.F. ZIMMERMAN, R.: C. CARRUESCO)

- "Further on the linearized shallow water waves over sloping bottom" E.O. OKEKE (Nigeria)

- "An investigation of the heat budget of the Indian River Lagoon, Florida, during winter months" N.P. SMITH (U.S.A.)

- "The Patos Lagoon estuary (Brazil) : hydrochemical considerations" R. KANTIN, M.G. ZEPKA BAUMGARTEN (Brazil)

- "Tectonic control of coastal lagoon formation in passive continental margin : example from Kerala, Southwest India" S. SINHA-ROY (India)

- "Influence des travaux récents et des périodicités astronomiques sur l'"acqua alta" à Venise (Italie) : la réponse des marégraphes" P.A. PIRAZZOLI (France)

- "Seasonal variations of heat flux at the water-sediments interface in very shallow lagoons" L. BATTISTON, A. GIOMMONI, L. PILAN, Z. VINCENZI (Italy)

- "Eutrophication of a western Australian estuary" E.P. HODGKIN, P.B. BIRCH (Australia)

- "Winter and spring circulation patterns in Arctic barrier island lagoons" J.B. MATHEWS (U.S.A.)

Sedimentation models. Geochemistry and metabolism
(P. : H.G. GIERLOFF-EMDEN, R. : A. KLINGEBIEL)

- "The estuary of lagoa dos Patos : sedimentology and environmental factors" L.J. CALLIARI, C. HARTMANN (Brazil)

- "Hypersaline lagoonal deposits, Laguna Mormona, Baja California, Mexico" S.P. VONDER HAAR, D.S. GORSLINE (U.S.A.)

- "Evidence of metal diagenesis and pollution in the tidal flats of the Marennes-Oléron Bay : application of metal sequential extraction" H. EL GHOBARY, C. LATOUCHE (France)

- "Sédimentologie d'un écosystème lagunaire actuel au Maroc : l'Oulja de Oualidia" J.C. BIDET, C. CARRUESCO (France)

- "A study of geochemistry and hydrodynamics in Hutt lagoon Western Australia" ARO V. ARAKER (Australia)

- "Formation et évolution sédimentologique et géochimique de lagunes méditerranéennes" G. CAUWET, D. FAGUET, R. MARTIN, A.MONACO, M. OUAKAD, N. SOUSSI (France)

- "Aperçu sur la géochimie des lagunes du Sud-Est tunisien. Exemple de la lagune d'El biban" K. MEDHIOUB (Tunisie)

- "Le delta actuel du Rio Paraiba do Sul. Signification des lagunes côtières isolées entre les cordons sableux près du Cap Sao Tomé, RJ, Brésil) G. DIAS (Brésil)

Stress, toxic effects of metals (P.: D.S. GORSLINE, R.: C. HEIP)

- "Metal solubilisation during "Trichodesmium" blooms in the coral sea" G.B. JONES, C. BURDON-JONES, T.G. THOMAS (U.K.)

- "The toxicological characteristics of the anthropogenic impurities in the coastal ecosystems" S.A. PATIN (U.S.S.R.)

- "Preliminary survey of the state of pollution of the coastal environment of Ghana" C.A. BINEY (Ghana)

- "Les peuplements benthiques liés à la pollution en zone urbaine d'Abidjan (Côte d'Ivoire)" S.G. ZABI (Côte d'Ivoire)

- "Mathematical modelling for kinetics of microelements exchange by marine organisms from Black Sea" V.N. EGOROV, V.N. IVANOV (U.S.S.R.)

- "Sub-tropical lagoons under stress" M. NICHOLS (U.S.A.)

- "Contribution à l'étude de l'eutrophisation dans le lac de Tunis" M. BELKHIR (Tunisie)

- "Trace metal pollution of a coastal lagoon, indicated by soils and plants of the surrounding salt marshes" P. VESTERGAARD (Denmark)

Poster presentations

- "Fungal decomposition of Sawdust in Lagos lagoons" T.V.I. AKPATA, J.A. EKUNDAYO (Nigeria)

- "Nutrient export from a Caribbean lagoonal ecosystem" P.R. BACON (U.K.)

- "Sources et diffusion des oligo-éléments métalliques dans le bassin d'Arcachon (côte atlantique française) C. CARRUESCO, J.M. JOUANNEAU, Y. LAPAQUELLERIE (France)

- "Carbohydrates as indicators of the origin and evolution of organic matter in the sediments of "Etang de Berre" D. DELMAS (France)

- "Pouvoir autopurateur d'une lagune tropicale (Elbrié, Côte d'Ivoire) vis à vis des matières organiques: influence de la température de la salinité et de la circulation des eaux" PH. DUFOUR (France)

- "Fulvic acids determination in marine waters by spectro-fluorimetry Characterization and quantification, state of progress of this new technique" M. EWALD, C. BELIN, P. BERGER (France)

- "La matière organique particulaire dans les eaux du bassin de Marennes-Oléron et de ses marais adjacents (claires): conséquences pour la nutrition de l'huitre Crassostrea gigas" M. HERAL, Y. ZANETTE, J.M. DESLOUS-PAOLI, J.M. ROBERT, D. RAZER (France)

- "Métabolisme et flux d'énergie dans les lagunes aménagées de la côte Atlantique : Bassin d'Arcachon" P. LASSERRE, J. CASTEL, C. COURTIES, G. DEUSTUA, D. MOREAU, T. TOURNIE (France)

- "Relaciones quimicas en sistemas costeros del litoral mediterraneo" P. LOPES (España)

- "Etude d'une communauté bactérienne productrice de méthane en milieu lagunaire" D.C. MARTY, S.D. CASTANIER, A.J.M. BIANCHI (France)

- "Les claires ostréicoles de la Côte Atlantique française : caractéristiques physico-chimiques et fertilité des eaux, biomasses micro-algales" J.M. ROBERT, Y. ZANETTE, Y. RINCE, S.Y. MAESTRINI, M. HERAL, J.P. DRENO (France)

III. "LAGOON LIFE"

Plenary session (P. : J. COSTLOW, V.P. : WANG BAO CAN, R. : R.C. NEWEL)

- "Nutrient dynamics, primary production and fisheries yields of lagoons" S.W. NIXON (U.S.A.)

- "Critères d'adaptation génétique à l'environnement saumâtre : exemples de la lagune de Venise et d'autres sites" C. BATTAGLIA (Italie)

- "Environmental adaptation to lagoon systems" F.J. VERNBERG (U.S.A.)

- "Some observations concerning the development of the mangrove swamps on the continental coast of Ecuador and Tumbez (Peru)" G. CINTRON M., R. HORNA Z., R. PAREDES S., I. SOLIS C., C. BONIFAZ B.

Ordinary sessions

Population dynamics I (P. : M. ZABI, R. : M. DURAND)

- "Variations spatio-temporelles de l'abondance et de la taille de la crevette "Penaeus notialis" en Casamance (Sénégal)" L. LE RESTE (France)

- "Penaeid shrimp population dynamics in Terminos lagoon and adjacent waters, Campeche, Mexico" A. GRACIA, L.A. SOTO (Mexico)

- "Factors affecting the immigration of postlarval penaeid shrimp into a Mexican lagoon system" J. Mc MAIR, J.L. WATKINS, D.I. WILLIAMSON (U.K.)

- "The ecology and "Penaeus" fisheries of a coastal lagoon" R.K.G. PAUL, A.B. BOWERS (U.K.)

Population dynamics II - Fish, aquaculture
(P. A. BEN TUVIA, R. : A.V. BOTELLO)

- "Etude du peuplement de poissons dans les lagunes des mangroves de Guadeloupe (Antilles françaises)" M. LOUIS, G. LASSERRE (France)

- "Les ressources halieutiques des lagunes ivoiriennes" J.R. DURAND (France)

- "Ecosystem dynamic in Puerto Real, a natural tidal inlet of Terminos lagoon in the southern Gulf of Mexico : patterns of nychtemeral and seasonal programming of fish migration, diversity and abundance" A. YANEZ-ARANCIBIA, AL LARA DOMINGUEZ, P. SANCHEZ GIL, I. VARGAS MALDONADO, P. CHAVANCE, F. AMEZCUA LINARES, A. AGUIRRE LEON, S. DIAZ RUIZ (Mexico)

- "The status of a small-scale fishery in a coastal lagoon of Venezuela. A plan to increase its production" M. PADRON (Venezuela)

- "The management of eels in the valle di Comacchio lagoon" M. GARRO, L. LANIADO, R. ROSSI (Italy)

- "Saliculture et aquaculture dans le marais de Guérande (France). Un exemple d'utilisation rationnelle du milieu naturel" D. AUBIN (France)

- "Les migrations mer-lac et lac-mer des espèces de poissons dans le lac de Tunis" C. CHAUVET, B. TURKI, R. TABICHE, M. SANEKLI (France)

Production primaire (P. : F.J. VERNBERG)

- "Primary production in the Laguna de Terminos, a tropical estuary in the southern Gulf of Mexico" J.W. DAY, R.H. DAY, M.T. BARREIRO, F. LEY-LOU (U.S.A. and Mexico)

- "Comparative study of seasonal change of phytoplankton in coastal lagoons of the Ebro delta in relation to environmental factors" F.A. COMIN (Spain)

- "Aquatic environments along the spanish mediterranean coast, defined by physicochemical and biotic variables" P. LOPEZ, F.A. COMIN, R. MARGALEF-MIR, X. TOMAS (Spain)

- "Primary productivity and nutrients in mediterranean lagoons : empirical relationships and general processes" G.F. FRISONI, D. VAULOT (France)

- "Evaluation de la biomasse microbienne dans une lagune tropicale" L. LEMASSON, J. PAGES (France)

- "Production des micro-algues des claires ostréicoles en relation avec l'azote organique dissous excrété par les huîtres" J.M. ROBERT, S.Y. MAESTRINI, M. HERAL, Y. ZANETTE (France)

- "Trichodesmium blooms (red tide) and fisheries at Kavaratti lagoon of Arabian Sea" V.D. RAMAMURTHY (India)

- "Production of Eelgrass Zostera Marina L. in Odawa Bay, Central coast of Japan" K. AIOI (Japan)

Community structure and food-webs
(C. : V.D. RAMAMURTHY, R. : A. YANEZ-ARANCIBIA)

- "Dynamique des communautés bactériennes d'une eau lagunaire enrichie en azote" F. VAN WANBEKE, M.A.G. BIANCHI, A.J.M. BIANCHI (France)

- "Cinétique démographique et structure des communautés meiobenthiques dans des écosystèmes lagunaires tempérés (côte atlantique)" J. CASTEL (France)

- "Life-cycles and productivity of brakish water meiobenthic populations" C. HEIP, P. HERMAN, N. SMOL, G. VRANKEN (Belgium)

- "El zooplancton de las lagunas costeras de Venezuela" E. ZOPPI DE ROA, D.T. ZACARIAS (Venezuela)

- "Structure et dynamique du zooplancton dans deux lagunes du Delta du Pô" I. FERRARI, V.U. CECCHERELLI, M.G. MAZZOCCI (Italie)

- "Production and zooplankton community structure in the surrounding sea and lagoon at Kavaratti Atoll (Lakshadweep)" S.C. GOSWANI (India)

- "Les communautés phytoplanctoniques et benthiques d'un milieu paralique hypersalé : la Bahiret et Biban (Tunisie). Critère d'analyse du fonctionnement d'un écosystème lagunaire" O. GUELORGET, G. FRISONI, PERTUISOT (France)

- "The effect of seasonal canal discharge of freshwater on the stability of of two seagrass benthic communities in Biscayne National Park, Florida" I.M. BROOK (U.S.A.)

- "Variations de l'abondance et répartition spatio-temporelle des crevettes (Penaeidea et Caridea) dans la mangrove d'un lagon guadeloupéen (Antilles françaises) R. ROJAS-BELTRAN (France)

Panel presentations

Lagoon life

- "Evolution du peuplement ichtyologique d'une baie urbaine de la lagune Ebrié" J.J. ALBARET, J.M. ECOUTIN (France)

- "Zygogenetical and parthenogenetical Artemia in the Cadiz Sea side salterns" F. AMAT (Spain)

- "Preliminary study of benthic intertidal communities (soft substrates of Tejo estuary)" J. CALVARIO (Portugal)

- "Dynamique du zooplancton et recrutement larvaire : plateau Sud Gascogne, Bassin d'Arcachon" J. CASTEL, C. COURTIES, C. CAZAUX, P. LASSERRE (France)

- "Nematode sub-community structure and its relations with substratum characteristics in a lagoon of the Po river Delta" V.U. CECCHERELLI, F. CEVIDALLI (Italy)

- "Lagoon communities of the gulf of Mexico. A comparative analysis" E.A. CHAVEZ (Mexico)

- "Ecologie des juvéniles de quelques téléostéens amphihalins des marais maritimes du Bassin d'Arcachon" C. CLUS, P.J. LABOURG (France)

- "Recherches liées à l'aquaculture des Chrysichthys (poissons siluriformes) en Côte d'Ivoire" A.K. DIA, S. HEM (Côte d'Ivoire)

- "Primary productivity of mangrove in a tropical estuarine lagoon system" F. FLORES-VERDUGO, L.C. BOJORQUEZ (Mexico)

- "Contributions à l'étude biologique d'une lagune de la côte orientale corse (l'étang d'Orbino)" G.F. FRISONI, O. GUELORGET (France)

- "Succeción de las poblaciones de crustaceos en un sistema de Lucios del Parque nacional de Donana (España)" A. FUREST, J. TOJA (España)

- "Contribución al conocimiento de la productividad primaria en la laguna de Caimanero, Sinaloa, Mexico" G. GALINDO (Mexico)

- "Aspectos ecologicos y comunidades de Moluscos en lagunas costeras del sur del golfe de Mexico" A. GARCIA-CUBAS, V. ANTOLI (Mexico)

- "The effects of long-term salinity fluctuations on the fauna and floral of a brackish-water lagoon, Lady's Island Lake, Ireland" B. HEALY, D. Mc GRATH, R. BATES (U.K.)

- "Structure démographique de la macrofaune dans les lagunes tempérées du littoral Atlantique" P.J. LABOURG (France)

- "Observations préliminaires sur la croissance en élevage de Tilapia Heudelotii et de T. Guineensis" M. LEGENDRE (France)

- "Macrophytic vegetation in Mediterranean coastal lagoons" R. MARGALEF-MIR (Spain)

- "Quelques observations sur les parasites branchiaux du loup Dicentrarchus Labrax (Linnaeus, 1758) et de la daurade, Sparus aurata Linnaeus, 1758 dans les étangs littoraux du Languedoc-Roussillon" G. OLIVER (France)

- "The possibility of the introduction of cuttle-fish (Sepia officinalis) in a management strategy for the coastal lagoons" G.B. PALMEGIANO, R. SEQUI (Italy)

- "Les microphytes des claires ostréicoles : un potentiel biologique déterminant en conchyliculture" Y. RINCE, J.M. ROBERT (France)

Fisheries, aquaculture

- "The socio-economic problems of introducing new production techniques on the Nakwa lagoon in the central region of Ghana" J.A. ADUMUA-BOSSMAN (Ghana)

- "The Galaxea lagoon of Krusadai Island, Gulf of Nanaar (India). Its science, status and need" J. AZARIAH, P. SALDANHA, A. HILDA (India)

- "La pêche dans l'eau lagunaire à peuplement contrôlé : Problèmes de recrutement dans la pêcherie en termes de sélectivité intraspécifique (SIS) et interspécifique (SES) C. CHAUVET (France)

- "La Bordigue : Possibilité d'utilisation pour contrôler la production" C. CHAUVET (France)

- "Application of coastal ponds for mass-rearing of marine fish fry" V. OIESTAD, P.G. KVENSETH (Norvège)

- "Las lagunas costeras, el manglar y los recursos marinos en Santa Catarina, (Brazil)" B. SIERRA DE LEDO (Brazil)

- "Ecological characterization of Terminos lagoon, a tropical estuary in the southern gulf of Mexico" A. YANEZ-ARANCIBIA, J.W. DAY (Mexico)

- "Les lagunes côtières tunisiennes : leur classification" J. ZAOUALI (Tunisie)

IV. SCIENTIFIC MANAGEMENT OF COASTAL LAGOONS

Plenary session (C. : B. BATTAGLIA, V.C. : R. HORNA ZAPATA, R. : W. VERNBERG)

- "Coastal lagoons in a coastal area development and management perspective" S.M. VALLEJO (United Nations)

- "Coastal lagoon management and research : a delicate task of translation" V. LEE (U.S.A.)

Ordinary sessions

Management I (C. M. NICHOLS, R. : C. LATOUCHE)

- "L'imagerie Landsat et la cartographie des formations quaternaires des zones lagunaires et estuariennes de l'Afrique de l'Ouest" E.S. DIOP (Sénégal)

- "Bonne Anse : évolution récente depuis la réalisation d'ouvrages de correction" C. ORGERON (France)

- "Ecosystèmes mangroves : fonctionnement, utilité, évolution" F. BLASCO (France)

- "The selection of management strategies for New England coastal lagoons" S. OLSEN (U.S.A.)

Management II (C. : P. VESTERGAARD, R. : J. LANG)

- "Etude d'une séquence Mangrove-Tanne en milieu équatorial" J.M. LEBIGRE, C. MARIUS (France)

- "The management of eels in the Valle di Comacchio lagoon (Italy)" M. GATTO, E. LANIADO, R. ROSSI (Italy)

- "Land accretion and land erosion and reclamation in coastal areas of Bay of Bengal" N. AHMAD (Bangladesh)

- "Pouvoir auto-épurateur d'une lagune tropicale (Ebrié, Côte d'Ivoire) vis-à-vis des matières organiques : influence de la température, de la salinité et de la circulation des eaux" P. DUFOUR (France)

- "Contribución al conocimiento de la estructura, flora, fauna y sedimentos de manglares en la bahia de Cartagena, Colombia, America del Sur" H.J. QUIROS, W. CIFUENTES ARAGON (Colombia)

- "L'interface homme/milieu dans l'histoire des lagunes ivoiriennes" F. VERDEAUX (France)

- "Management conflicts existing at the lagoon of Aveiro" A. HALL (Portugal)

<u>Panel presentations</u> : Management - conservation

- "Comparaison des hydroclimats des lagunes Ebrié et Aby (Côte d'Ivoire)" J.M. CHANTRAINE (France)

- "Nutrient dynamics in a tidal inlet of the eastern Scheldt" L.A. GELDERMALSEN-VAN (The Netherlands)

- "Mise en évidence d'une zone à "structures circulaires de végétation" dans les mangroves de la Mondah (Gabon)" J.M. LEBIGRE, C. MARIUS (France)

- "Efecto de la evaporación-dilución sobre el ciclo de nutrientes en un estanque costero" O. LLINAS, M.J. RUEDA (España)

- "Influence des variations du niveau marin et des débits fluviaux dans l'évolution des écosystèmes estuaires" J. MONTEILLET, H. FAURE, J.Y. GAC (France)

- "Les études caractéristiques du Lac Nokoué de 1978 à 1981 (Benin, Afrique de l'Ouest)" H. TEXIER (France)

GUIDED DISCUSSIONS

1. Synoptic reports on subjects dealt with at the Symposium

   C. : M. VIGNEAUX, V.C. : GARCIA-CUBAS, R. : S. OLSEN

2. Priority conditions for durable utilization of lagoons : a "world strategy"

   C. : M. VIGNEAUX, V.C. : J.B. AMON KOTHIAS, R. : P. LASSERRE

FINAL RECOMMENDATIONS

BUREAU OF THE CLOSING CEREMONY

Michel VIGNEAUX,	Chairman of the Organizing Committee
Abdul Razzak KADDOURA,	Assistant Director General of Unesco for Science
Michel CREPEAU,	Minister of Environment
Jacques CHABAN DELMAS,	Deputy, Mayor of Bordeaux
Hank POSTMA,	Chairman of the Symposium
Pierre LASSERRE,	Secretary General of the Symposium

ANNEX III

QUESTIONS FOR PANEL DISCUSSION

I - SCIENTIFIC ASPECTS

1) Are coastal lagoon systems more productive than other coastal areas, such as estuaries and deltas, or continental shelves ?

2) Do coastal lagoons export or import organic matter ? Are the inputs from land important ?

3) What is the effect on coastal lagoons of the eutrophication of coastal waters ?

4) What is the present state of the art of modelling the ecosystems of coastal lagoons, including the effects of flushing rates and of import and export of materials ?

II - EXPLOITATION AND MANAGEMENT

1) Are lagoon fisheries as productive as is generally claimed ? If so, what is their future ?

2) What is the importance of nurseries in lagoons compared with seaboard and estuary nurseries ?

3) Will it be possible to control and increase the biological output of lagoon ecosystems ?

4) Might ecodevelopment models be devised, based on recent discoveries in biotechnology ?

5) Are rapid demographic growth, industrial development, exploitation of fossil fuel and other minerals, morphological changes, etc..., bringing many lagoons in jeopardy ?

6) What is the present situation regarding laws and rules regulating the conservation and the management of the coastal lagoons ?

UNESCO TECHNICAL PAPERS IN MARINE SCIENCE

Titles of numbers which are out of stock

No.		Year	SCOR WG
1	Incorporated with Nos. 4, 8 and 14 in No. 27	1965	WG 10
2	Report of the first meeting of the joint group of experts on photosynthetic radiant energy held at Moscow, 5-9 October 1964. Sponsored by Unesco, SCOR and IAPO	1965	WG 15
3	Report on the intercalibration measurements in Copenhagen, 9-13 June 1965. Organized by ICES	1966	-
4	Incorporated with Nos. 1, 8 and 14 in No. 27	1966	WG 10
5	Report of the second meeting of the joint group of experts on photosynthetic radiant energy held at Kauizawa, 15-19 August 1966. Sponsored by Unesco, SCOR, IAPO	1966	WG 15
6	Report of a meeting of the joint group of experts on radiocarbon estimation of primary production held at Copenhagen, 24-26 October 1966. Sponsored by Unesco, SCOR, ICES	1967	WG 20
7	Report of the second meeting of the Committee for the Check-List of the Fishes of the North Eastern Atlantic and on the Mediterranean, London, 20-22 April 1967	1968	-
8	Incorporated with Nos. 1, 4 and 14 in No. 27	1968	WG 10
9	Report on intercalibration measurements, Leningrad, 24-28 May 1966 and Copenhagen, September 1966; organized by ICES	1969	-
10	Guide to the Indian Ocean Biological Centre (IOBC), Cochin (India), by the Unesco Curator 1967-1969 (Dr. J. Tranter)	1969	-
12	Check-List of the Fishes of the North-Eastern Atlantic and of the Mediterranean (report of the third meeting of the Committee, Hamburg, April 1969)	1969	-
13	Technical report of sea trials conducted by the working group on photosynthetic radiant energy, Gulf of California, May 1968; sponsored by SCOR, IAPSO, Unesco	1969	WG 15
14	Incorporated with Nos. 1, 4 and 8 in No. 27	1970	WG 10
17	An intercomparison of some current meters, report on an experiment of Research Vessel Akademic Kurchatov, March-April 1970, by the Working Group on Current Velocity Measurements; sponsored by SCOR, IAPSO, Unesco	1974	WG 21
18	A review of methods used for quantitative phytoplankton studies; sponsored by SCOR, Unesco	1974	WG 33
21	An intercomparison of open sea tidal pressure sensors. Report of SCOR Working Group 27: "Tides of the open sea"	1975	WG 27
22	European sub-regional co-operation in oceanography. Report of working group sponsored by the Unesco Scientific Co-operation Bureau for Europe and the Division of Marine Sciences	1975	
23	An intercomparison of some current meters, III. Report on an experiment carried out from the Research Vessel Atlantis II, August-September 1972, by the Working Group on Continuous Velocity Measurements : sponsored by SCOR, IAPSO and Unesco	1975	WG 21